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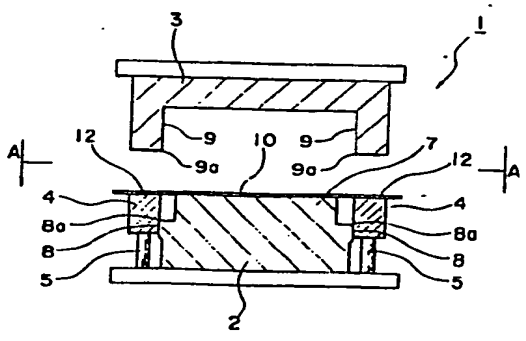
(54) **A method of making a laminated body and a molding apparatus for the same.**

(57) A method relates to a method of making a laminated body having a bended part which consists of an upper layer member (10) and a synthetic resin 13 and being in good accordance with the each center point of the upper layer member 10 and the synthetic resinous body which comprises the steps of:

arranging the upper layer member 10 between an upper layer member-fixing frame 4 and the female mold 3; holding the periphery 12 of the member 10 ; giving form to the member 10 and at the same time cutting the member 10 between the outer side face 8 edge 8a of the male mold 2 and the inner side face 9 edge 9a of the female mold 3 within measure by mold-tightening the female and male molds together; supplying a required molten resin 11 prior to the completion of the above-mentioned cutting ; and molding the laminated body 14 aimed-at.

And an apparatus 1 which comprises at the very least a male m ld 2, a female m ld 3, an upper layer member-fixing frame 4, an expanding and contracting means 5, and b th the outer side edge 8a of the male mold 2 and the inner side edge 9a of the female mold 3 consist of the cutter of the upper layer member 10.

FIG. 1



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A Method of Making a Laminated Body and a Molding Apparatus for the Same

This method and apparatus relates to a method of making a laminated body having a bended part, which consists of an upper layer member and a synthetic resin and a molding apparatus for use in the same.

As one methods of making a laminated body, there is proposed, for example, in the Japanese Patent Application Disclosure No.150740 of 1984 a method whereby the molding of the laminated body is performed by the use of a molding apparatus which is provided shiftably with a female mold or a male mold and with an upper layer member-fixing frame having a sliding port wherethrough the male mold passes slidingly, and wherein, after holding an upper member between the upper layer member-fixing frame and the female mold, a molten resin is supplied between the upper layer member and the female mold or the male mold and then the mold-tightening of the female mold and the male mold is conducted.

When using this former method as mentioned above, it is indeed impossible to make such kind of a laminated body as possessing a good appearance, clear of wrinkles or tears over the upper layer member covering the synthetic resin, further it needs a cutting process and a cutting apparatus for the upper layer member after giving form process, furthermore it is dificult to be in accordance with the each center point of the upper layer member and the synthetic resinous body by the former apparatus being non-conbined both the molding apparatus and cutting apparatus .

Synthetic resinous moldings are being used nowadays in large quantities in every field including, for example, motorcars, home electric appliances, and others for reasons of

the inexpensiveness, the easy shapability as desir d, and the lightweightiness of them.

On the other hand, however, these molded goods as they are have certain defects that are cheap-looking, cold to the feed or easy to be scratched, wherefrom these has been pursued strongly how to impart to them a sort of some decorativeness or a sense of being soft to be touch from way back.

For such reasons, although a variety of investigations and researches have been done in the past with the object of acquiring some kind of compound articles being endowed with any function enough to satisfy such demands as mentioned above, yet it is proved that it is difficult for the products made of a single substance to possess the free shapability, the desired strength and the surface property being improved in relating to the above-mentioned defects at that .

Therefore, in the present state of things, these are widely used in general such kinds of laminated bodies as being assembled with plural materials which have a variety of functions.

By the way, in this specification, the one whose outer side face corresponds to the side face of the outermost circumference being opposite to each other at the mold-tightening time is called a male mold, while the one whose inner side face corresponds to the same as above-mentioned side face of the outermost circumferenes being oppsite to each other at the same mold-tightening time is called a female mold.

The method and the apparatus according to our invention both have been accomplished by aiming to solve the above-mentioned problem lying latent in the former method and thereby enables to obtain the laminated body being covered by the upper layer member without

wrinkleness, tears, and being in good accordance with the each center point of the upper layer member and the synthetic resinous body and being further adapted to mass production because of their working process and manufacturing machine being able to be simplified in planning and construction.

Our method according to the invention can solve the above-mentioned problem of the former method by providing a method of making a laminated body consisting of an upper layer member, which comprises the steps of ;

arranging the upper layer member between an upper layer member-fixing frame which is attached shiftably either on the side of a male mold or on the side of a female mold of a molding apparatus provided with the male mold and the female mold both sliding on the each face of the whole circumference and which has a sliding opening where the outer side face of the male mold slides over the whole circumference and the convex parts of the male mold inserts through, and the female mold ; holding the periphery of the upper layer member between the upper layer member-fixing frame and the female mold;

giving form to the upper layer member and at the same time cutting the upper layer member off between the outer side face edge of the male mold and the inner side face edge of the female mold within measure by mold-tightening the female and male molds together;

continuing to place the upper layer member thus given form while leaning as it stands;

supplying a required molten resin from a molten resin passage between the upper layer member and the male mold prior to the completion of the above-mentioned cutting ;

and molding the molten resin to obtain the laminated body aimed-at.

Further, our apparatus according to the invention can solve the above-mentioned problem of the former apparatus by providing as an optimum apparatus for effectuating the

above-mentioned method according to our invention a molding apparatus which comprises at the very least a male mold, a female mold, an upper layer member-fixing frame, an expanding and contracting means, and which is characterized in that the upper layer member-fixing frame is mounted either on the side of the male mold or on the side of the female mold shiftably by means of the expanding and contracting means and has a sliding opening where the outer side face of the male mold slides over the whole circumference and the convex parts of the male mold inserts through ;

both the outer side edge of the male mold and the inner side edge of the female mold consist of the cutter of the upper layer member ; and the outer side of the male mold and the inner side of the female mold slide each other over the whole of the circumference .

BRIEF DESCRIPTION OF THE DRAWINGS

Fig.1 to 19 are diagrams for illustrating an exemplary embodiment of the method and apparatus according to the present invention and also the modified embodiment 1 to 4 thereof ,out of which :

Fig. 1 is a sectional view thereof;

Fig. 2 is a view seen in the direction of the arrowheads of the lines A-A of Fig. 1;

Fig. 3 is a sectional view thereof;

Fig. 4 is a sectional view ;

Fig. 5 is a sectional view ;

Fig. 6 is a sectional view of the laminated body;

Fig. 7 is a sectional view of the laminated body;

and Fig. 8 is a sectional view the laminated body.

Fig.9 to 11 are diagrams for illustrating the modified embodiment 1, wherein ;

Fig. 9 is sectional view thereof;

Fig.10(a) is a sectional view at the time of the finishing the moldings ;

Fig.10(b) is a partially enlarged view of Fig.10(a) ;

and Fig.11 is a sectional view of the laminated body .

Fig.12 to 15 are diagrams for illustrating the modified embodiment 2, wherein ;

Fig.12 is a sectional view thereof ;

Fig.13 is a sectional view ;

Fig.14 is a sectional view ;

and Fig.15 is a sectional view .

Fig. 16 to 18 are diagrams for illustrating the modified embodiment 3, wherein ;

Fig. 16 is a sectional view thereof;

Fig. 17 is a sectional view ;

and Fig. 18 is a sectional view .

Fig. 19 is a sectional view for illustrating the modified embodiment 4.

DETAILED DESCRPTION

[Exemplary Embodiment]

Now ,we describe in details for an exemplary embodiment of the method and apparatus according to the present invention with reference to illustrating of Fig.1 to 8 .

Fig. 1 and Figs. 3 to 8 are sectional views for illustrating the exemplary embodiment ; Fig. 2 is a view seen in the direction of the arrowheads of the lines A-A of Fig. 1 ;

In the figures, the reference numeral 1 indicates a molding apparatus, the numeral indicates 2 a male mold , the numeral indicates 3 a female mold, the numeral 4 indicates an upper layer member-fixing frame, the numeral 5 indicates an expanding and contracting means, the numeral 6 indicates a sliding opening of the upper layer member-fixing frame 5, the numeral 8 indicates the outer side face of male mold 2 , the numeral 9 indicates the inner side face of female mold 3, the numeral 10 indicates an upper layer member, the numeral 11 indicates a molten resin,and the numeral 14 indicates a laminated body.

The molding apparatus 1 comprises the male mold 2, the upper layer member-fixing frame 4, the expanding and contracting means 5, these three being situated below, the female mold 3 being supported by a well-known going up-and-down mechanism (not shown) and being situated above.

The upper layer member-fixing frame 4 which has the upper face being opposite to the female mold 3 is mounted shiftably by a plurality of the expanding and contracting means 5, and possesses the sliding opening 6.

It is permissible for use in the expanding and contracting means 5 to adopt freely any known oil pressure cylinder, air pressure cylinder, air pressure spring, elastomeric spring, steel spring, and such like depending a required stroke.

In this connection, there can be adopted preferably such as some spring mechanism expanding and contracting in response to the mold-tightening force of both the molds, male 2 and female 3.

The convex parts 7 of the male mold 2 inserts into the sliding opening 6 which is shiftably slided by the outer side face 8 of the male mold 2 on the whole circumference.

The male mold 2 and the female mold 3 both slide on the outer side face 8 and the inner side face 9 of the whole circumference each other.

The cutting edges to be cut the upper layer member 10 off is consisted of the edge 8a of the outer side face 8 of the male mold 2 and the edge 9a of the outer side face 9 of the female mold 3.

In the case of the upper layer member 10 made of the soft material such as a paper or a cloth , the edge 8a of the outer side face 8 of the male mold 2 and the edge 9a of the outer side face 9 of the female mold 3 need to be made from the different material having the disparity degree of hardness each other.

It is preferably to select from S45C (J.I.S.name of steel) or S45C(J.I.S.name of steel) for the actuation side (the side of the

female mold 3 in this example) and from SKS (J.I.S.name of steel) or SKD11(J.I.S.name of steel) for the fixed side.

The clearance between the edge 8a of the outer side face 8 of the male mold 2 and the edge 9a of the outer side face 9 of the female mold 3 is commonly planned in small distance such as from 0.01mm to 0,2mm for cutting the upper layer member 10.

A little difference of the above clearance value is permitted owing to the each variety and the each thickness of the the upper layer member 10.

Using the molding apparatus 1 relating to the exemplary embodiment which has such a construction as mentioned above, the method 1 according to our invention is effectuated, for example, in the sequence of processes from ① to ⑥ described below;

① To begin with, the upper layer member 10 is arranged between the upper layer member-fixing frame 4 and the female mold 3, to say more exactly, the upper layer member 10 is placed on the upper layer member-fixing frame 4. (See Fig. 1)

② Next, when making the going up-and-down mechanism actuate, the female mold 3 goes down, the periphery 12 of the upper layer member 10 is hold between the upper layer member-fixing frame 4 and the female mold 3 ,after that molten resin 11 is supplied into the space between the upper layer member 10 and the male mold 2. (See Fig.3)

Whereby the upper layer member-fixing frame 4 goes down following to contracting of the expanding and contracting means 5 by the mold-tightening force of holding the periphery of the upper layer member 10.

At this time, the supply of the molten resin 11 is conducted by a well-known melt-plasticizing means such as an extruder(not shown) through the molten resin passage (not shown) being provided in the interior of the male mold 2.

③ Just after that, the female mold 3 and the upper layer member-fixing frame 4 go down by making the going up-and-down mechanism actuate.

At the same time with the above, the molten resin 11 streams to compress the upper layer member 10 to the side of the female mold 3, in concert with which the molten resin 11 is squeezed into the cavity of the female mold 3 with the periphery 12 of the upper layer member 10 gliding between the upper layer member-fixing frame 4 and the female mold 3 and with the upper layer member 10 extending. (See Fig. 4)

④ By the female mold 3 continuing to go down further, the upper layer member 10 is cut by the both edge (8a) and (9a) and the both molds male 2 and female 3 aremold-tightened completely, and the upper layer member 10 is also molded to be given form, whereby the upper layer member 10 and the synthetic resin 13 are united in a laminated body and the molding is completed in doing so. (See Fig.5)

Therefore, the center points of the upper layer member 10 and the synthetic resinous bodys are in perfect accordance with each other.

In this method according to our invention, a point of time when the molten resin 11 is supplied is not restricted only to the above-described time.

It does not matter if the supply of the molten resin 11 is conducted either when both the male mold 2 and the female mold 3 are made to further approach as far as the position where the upper layer member 10 is suqeesed into the intermediary stage after the periphery 12 of the upper layer member 10 has been held , or the upper layer member 10 has been cut.

Futhermore, the supply of the molten resin 11 may be conducted before placing the upper layer member 10 on the upper layer member-fixing frame 4 (before holding the the upper layer member 10) in the state of Fig.1.

In the method according to our invention, the form and appearance of laminated body 14 is influenced whether the timing of the cutting step of the upper layer member 10 is in accordance with the timing of the mold-tightening step or not .

Hereinafter, the case 1 to case 3 of the above-influenced embodiments are described.

The case 1.

In the case that the timing of the cutting step of the upper layer member 10 is earlier than the timing of the mold-tightening step, the laminated body 14 that the sythetic resin body 13 is overflowed out of the end of the upper layer member 10 like Fig.6 is obtained .

The case 2.

In the case that the timing of the cutting step of the upper layer member 10 is earlier than the timing of the mold-tightening step but the both timings are in nearly accordance, the laminated body 14 that the sythetic resin body 13 is nearly-perfectly wrapped by the upper layer member 10 like Fig.7 is obtained .

The case 3.

In the case that the timing of the cutting step of the upper layer member 10 is in approximate accordance with the timing of the mold-tightening step, the laminated body 14 that the sythetic resin body 13 is perfectly wrapped by the upper layer member 10 like Fig.8 is obtained .

In the case 3, the upper layer member 10 may be imperfect cut as possible as cutting by hand pulling after molding.

In the method and apparatus according to our invention, it will do if the molten resin 11 is supplied between the upper layer member 10 and the male mold 2 through at least any one of the molten synthetic resin passages being provided at the inside of the male mold 2 or at the outside of the molding apparatus 1.

In the method and apparatus according to our invention, the periphery 12 of the upper layer member 10 sometimes shifts gradually toward the

inside of the female mold 3 with the progress of the molding, so that it is especially important to set the fixing force against the upper layer member 10, because the upper layer member 10 is liable to deform itself nearly along the form of the female mold 3 as the latter goes down.

Such being the case, when the fixing force working is too small, then the upper layer member 10 undergoes a big glide produced between the upper layer member 4 and the female mold 3, and thereby the upper layer member 10 broader than the area required for the laminated body 14 comes to be supplied into the female mold 3, which brings wrinkles to the laminated body 14, while on the other hand when the fixing force is too big, then the upper layer member 10 becomes unable to bear the tensile force created, thereby ending in the breakage.

In the method apparatus according to our invention, in case, for example the form of the laminated body 14 is simple, the opposite 2 edges each other of the upper layer member 10 may be only held, on the other hand, in case for example the form of the laminated body 14 is complex , the all edges of the upper layer member 10 must be held by opitmum fixing force for obtaining a the laminated body 14 without a wrinkleness and a breakage on the upper layer member 10 .

In our invention, in case, for example the form of the laminated body 14 is simple and some fiberpowerful in strechiness is used for the upper layer member 10 (there is often among various kinds of fibers such a one as having the strechiness of 400%), it is not always necessary that upper layer member 10 ought to have the gliding behavior as deseribed in the exemplary embodiment.

In order to set the above-mentioned fixing force at the time of effectuating the method according to the invention, it is necessary to select the optimum value being based on the properties of the materiales, that is, the strechiness or the squeezing rate of the upper layer member 10, the curvature of every vertex and edges of the molded goods and, others, however, the one generally used is of 5 ~300 kg/ cm to the sectional area of the fixing part.

In setting the required area of the upper layer member 10, it is necessary to design the upper layer member 10 so as to check the occurrence of trimming losses as possible first on the basis of the developing area of the laminated body 14 and next by reducing the size of the upper layer member 10 while taking the strechiness thereof into consideration.

For the upper layer member 10 being used in the method according to the invention, there can be named the following substances: woven stuff, unwoven stuff, metal, fiber, thermoplastic resinous net, paper, metal foil, and sheet or film made of thermoplastic resin and thermoplastic elastomer, but it dose not matter if using things decorated with concavoconvex patterns of tie-dyed fabrics, by printing or dyeing, or if using foaming bodies and further it is also poissible to use the above mentioned substances in the form of a laminated article which is made by laminating a single or two or more sorts of them using some adhesive agents and the like.

In using such a kind of an upper layer member 10, it will do also if pre-heating it in order to regulate the stress or the strechiness of the upper layer member 10 prior to the supply of it.

For the synthetic resin 13 used in the method according to the invention, it is possible to use all of such substances as being ordinarily used in the compression molding, the injection molding, and the extrusion molding, for example, nonfoaming or foaming resins made of thermoplastic elastomers such as polypropylene, polyethylene, polystylene, acrylonitrile-stylene-butadien block copolymer, thermoplastic resin like nylon, ethylene-propylene block copolymer, styrene-butadiene, block copolymer, and such like, and further the stuffs above mentioned being made to contain fillers, for example, inorganic filler, glass fiber etc., etc, and such additives as pigment, talc, antistatic agent, and others.

[Modified Embodiment 1] :

Figs. 9 to 11 are sectional views explaining the modified embodiment 1 of the method and apparatus according to the invention, wherein the male mold 2 has a notch 8b being continuing the whole circumference in the vicnity of the outer side face 8 edge 8a of it.

The length (L) of the notch 8b is decided owing to the form of the lminated body14 and the matterial of the upper layer member 10, it is not restricted in the same length as the length of each side of the outer side face 8 edge 8a of the male mold 2 through the whole circumference.

And the width (W) of the notch 8b is planned owing to the size of the most extended measure in the plane direction and the most compressioned measure in the thickness direction of the upper layer member 10 during the whole molding process.

The clearance between the edge 8a of the outer side surface 8 of the male mold 2 and the edge 9a of the female mold 3 is commoly planed in small distance such as as from 0.01mm to 0.2mm for cutting the upper layer member 10, but a little difference out of the above clearance value is permitted owing to the each variety and the each thickness of the upper layer member 10.

When the method by using of the molding apparatus 1 according to this modified embodiement 1 is performed , the upper layer 10 slidingly inserts into the notch 8b prior to the finishing of mold-tightening (see Fig.9), and after that the laminated body 14 is prepared at the same time of the completion of mold-tightening (see Fig.10).

In this laminated body 14, the end of the upper layer 10 is expanded out of the outside face of the resin body 13 like Fig.10 and Fig.11.

Therefore, the expanded end of the upper layer 10 is bended into inner direction of the resin body 13, resultingly the laminated body 14 like Fig.11 is obtained.

In the modified embodiment 2 to 4 hereinafter described, although the relative position between their male molds 2 and their female molds 3 and the upper layer members fixing-frame 4 are subjects to change ,

they have basically the same construction as effect as mentioned in the exemplary embodiment.

[Modified Embodiment 2] :

Figs.12 to 15 are sectional views explaining the modified embodiment 2 of the method and apparatus according to the invention, wherein the upper layer member-fixing frame 4 is provided shiftably at the male mold 2 which is here situated above ,while on the other hand the female mold 3 is situated below.

The method according to the invention is effectuated by the molding apparatus 1 of this modified embodiment 2 going through the sequence of the following processes① to ④.

① The upper layer member 10 is placed on the female mold 3. (See Fig.12).

② Next, after holding the upper layer member 10 between the upper layer member-fixing frame 4 and the female mold 3 by means of the expanding and contracting means 5 (for the expanding and contracting means 5 in this case, it is possible to adopt an are pressure cylinder or an oil pressure cylinder), molten resin is supplied between the upper layer member 10 and the male mold 2 from outside the molding apparatus 1 (See Fig. 13).

③ When the going up-and-down mechanism is put into action without delay, then the male mold 2 goes down as the expanding and contracting means 5 contracts, while the molten resin 11 streams to push up the upper layer member 10 to the side of the female mold 3, in concert with which the upper layer member 10 is squeezed while gliding and stretching between the upper layer member-fixing frame 4 and the female mold 3 into the concave part produced at the side of the female mold 3 (See Fig. 14).

④ As the made mold 2 further goes down, the upper layer member 10 and the molten resin 15 unite in a body to be given form and to be cut,

and graduate into the completion of the molding as in the exemplary embodiment.

[Modified Embodiment 3] :

Figs.16 to 18 are sectional views explaining the modified embodiment 3 of the method and apparatus according to the invention, wherein the upper layer member-fixing frame 4 is provided shiftably at the male mold 2 which is here situated below ,while on the other hand the female mold 3 is situated above.

The method according to the invention is effectuated by the molding apparatus 1 of this modified embodiment 3 going through the sequence of the following processes.

The upper layer member 10 being placed on the female mold 3 like Fig. 12,next, after holding the periphery 12 of the upper layer member 10 between the upper layer member-fixing frame 4 and the female mold 3, molten resin 11 being supplied , the upper layer member 10 and the molten resin 11 unite in a body to be given form and to be cut by the mold-tightenings ,and graduate into the completion of the molding as in the exemplary embodiment (See Fig. 18).

[Modified Embodiment 4] :

Figs.19 is a sectional view explaining the modified embodiment 4 of the method and apparatus according to the invention, wherein the upper layer member-fixing frame 4 is provided shiftably at the female mold 3 which is here situated above.

The method according to the invention is effectuated by the molding apparatus 1 of this modified embodiment 4 going through the sequence of the following processes.

The upper layer member 10 being placed on the upper layer member-fixing frame 4 like Fig.19,next,molten resin 11 being supplied through molten resin passage (not shown)provided in the female mold 3,after holding the periphery 12 of the upper layer member 10 between the upper layer member-fixing frame 4 and the female mold 3, the upper

layer member 13 and the molten resin 11 unite in a body to be given form and to be cut by the mold-tightening, and graduate into the completion of the molding.

In the method and apparatus according to the invention, the separating direction namely here means the mold-tightening direction is not always only the hereinbefore deseribed vertical direction, but it does not matterif it is the horizontal directions, for example.

In this latter case, last the molten resin 11 should flow out of the molding apparatus 1, the supply of the molten resin 11 is peformed either after mold-tightening to some extent or before mold-tightening while making use of a receiver being built in advance within the apparatus.

[Effect of the invention]

As explained in detail in the above, the method according to the invention is designed in such a manner that comprises the steps of ;

arranging the upper layer member between an upper layer member-fixing frame which is attached shiftably either on the side of a male mold or on the side of a female mold of a molding apparatus provided with the male mold and the female mold both sliding on the each face of the whole circumference and which has a sliding opening where the outer side face of the male mold slides over the whole circumference and the convex parts of the male mold inserts through, and the female mold ;

holding the periphery of the upper layer member between the upper layer member-fixing frame and the female mold;

giving form to the upper layer member and at the same time cutting the upper layer member off between the outer side face edge of the male mold and the inner side face edge of the female mold within measure by mold-tightening the female and male molds together;

continuing to place the upper layer member thus given form while leaning as it stands;

supplying a required molten resin from a molten resin passage between the upper layer member and the male mold prior to the completion of the above-mentioned cutting ;

and molding the molten resin to obtain the laminated body aimed-at.

With such a construction, the method according to the invention has various effect that it not only requires any additives but also is adapted exllently to the mass producion in simple working processes, and that it able to make the laminated body being in possession of a good appearance without wrinkles or tears on the upper layer member and being short of wrinkes on the bended parts of the upper layer member, as a result of which there can be obtained the laminated body which is sort of residual stress owing to the orientation because of the molding of its synthetic resin here not being dependent on the injection molding method and further which has only a small deformation like distortion as well.

On the other hand, the molding apparatas according to the invention is designed in such a manner that it comprises at the very least a male mold, a female mold, an upper layer member-fixing frame, an expanding and contracting means, and which is characterized in that the upper layer member-fixing frame is mounted either on the side of the male mold or on the side of the female mold shiftably by means of the expanding and contracting means and has a sliding opening where the outer side face of the male mold slides over the whole circumference and the convex parts of the male mold inserts through ;

both the outer side edge of the male mold and the inner side edge of the female mold consist of the cutter of the upper layer member ;

and the outer side of the male mold and the inner side of the female mold slide each other over the whole of the circumference so that a cutting machine for the upper layer mamber is not only required separeately but also the method according to the present invention having the above mentioned effects is able to be effectuated easily.

Further, the preferable feeling of the laminated body produced in accordance with the method of the invention can be kept long because of the effective pressure required for molding the synthetic resin being small, for example, now by being capable of preventing the foaming layer from crusing in case of using some foaming sheet for the upper layer member now by being capable of preventing the napped part from falling in case of using the cloth treated by the nap-raising.

Claims:

1.A method of making a laminated body with a bended part consisting of an upper layer member,and a synthetic resin, which comprises at least holding an upper layer member between an upper layer member-fixing frame and the female mold,giving form to the upper layer member ,supplying a required molten resin and molding the molten resin which is characterized in that ;

arranging the upper layer member between an upper layer member-fixing frame which is attached shiftably either on the side of a male mold or on the side of a female mold of a molding apparatus provided with the male mold and the female mold both sliding on the each face of the whole circumference and which has a sliding opening where the outer side face of the male mold slides over the whole circumference and the convex parts of the male mold inserts through, and the female mold ;

holding the periphery of the upper layer member between the upper layer member-fixing frame and the female mold;

giving form to the upper layer member and at the same time cutting the upper layer member off between the outer side face edge of the male mold and the inner side face edge of the female mold within measure by mold-tightening the female and male molds together;

continuing to place the upper layer member thus given form while leaning as it stands;

supplying a required molten resin from a molten resin passage between the upper layer member and the male mold prior to the completion of the above-mentioned cutting;

and molding the molten resin to obtain the laminated body aimed-at.

2. A molding apparatus which comprises at the very least a male mold, a female mold, an upper layer member-fixing frame,an expanding and contracting means,which is characterized in that the upper layer member-fixing frame is mounted either on the side of the male mold or on the side of the female mold shiftably by means of the expanding and contracting means and has a sliding opening where the outer side face of the male mold slides over the whole circumference and the convex parts of the male mold inserts through ;

both the outer side edge of the male mold and the inner side edge of the female mold consist of the cutter of the upper layer member ; and the outer side of the male mold and the inner side of the female mold slide each other over the whole of the circumference .

3. A method of making a laminated body as set forth in claim 1, which is characterized in that the periphery of said upper layer member is held between said upper layer member-fixing frame being shiftably attached to the side of said male mold which is situated below and the female mold which is situated above.

4. A method of making a laminated body as set forth in claim 1, which is characterized in that the periphery of said upper layer member is held between said upper layer member beeing shiftably attached to the side of said male mold which is situated above and said female mold which is situated below .

5. A method of making a laminated body as set forth in claim 1, which is characterized in that the periphery of said upper layer member is held between said female mold which is situated below and said upper layer member-fixing frame being shiftably attached to the side of said female mold .

6. A method of making a laminated body as set forth in claim 1, which is characterized in that the periphery of said upper layer member is held between said female mold which is situated above and said upper layer meber-fixing frame being shiftably attached to the side of said female mold.

7. A method of making a laminated body as set forth in either of claims 3 to 6, which are characterized in that molten resin is supplied through a molten resin passage being provided in the interior said male mold.

8. A method of making a laminated body as set forth in either of claims 3 to 6, which are characterized in that molten resin is supplied through a molten resin passage being provided in the exterior said female mold.

9. A method of making a laminated body as set forth in either of claims 3 to 6, which are characterized in that molten resin is supplied through a molten resin passage being provided outside said molding apparatus.

FIG. 1

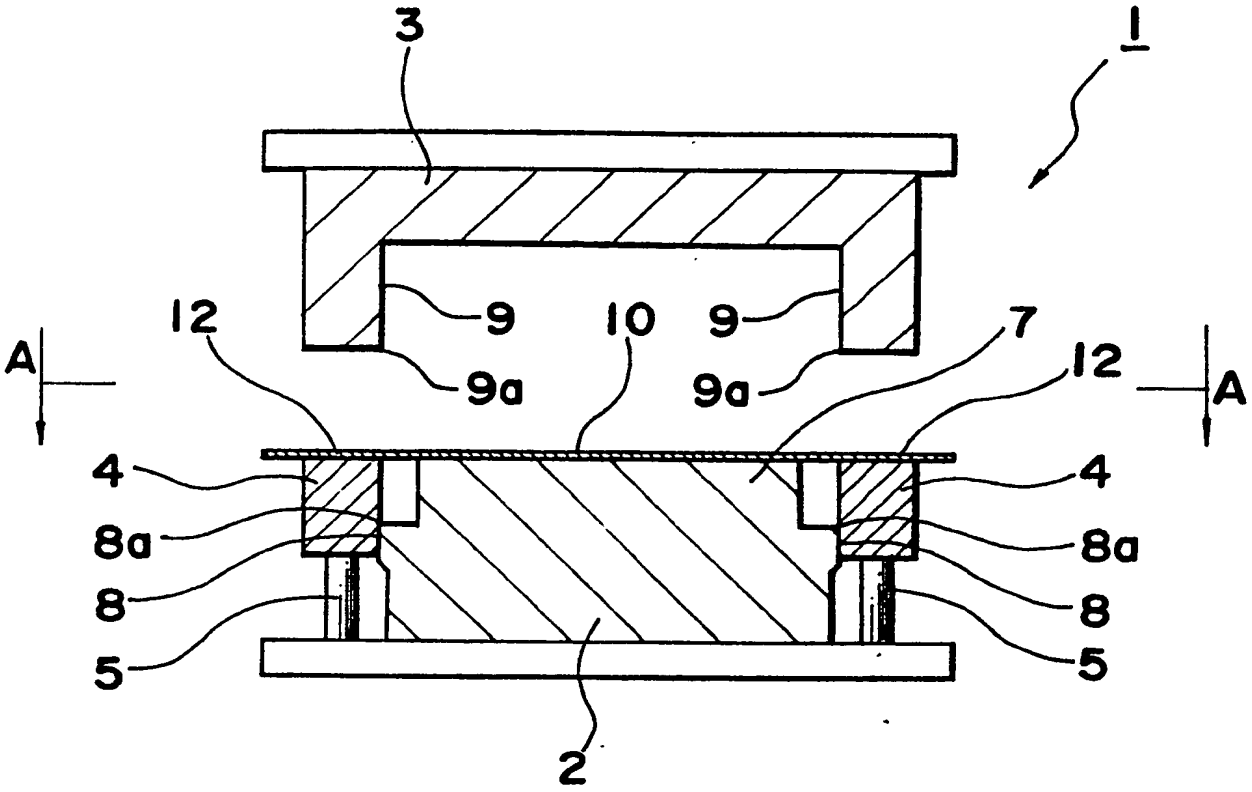

FIG. 2

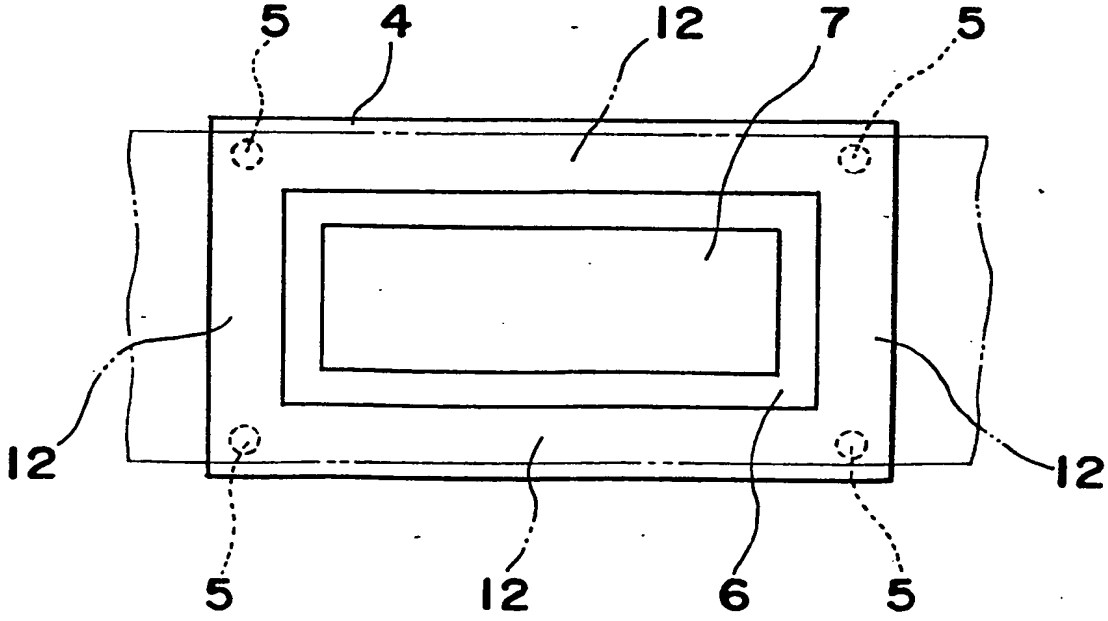

FIG. 3

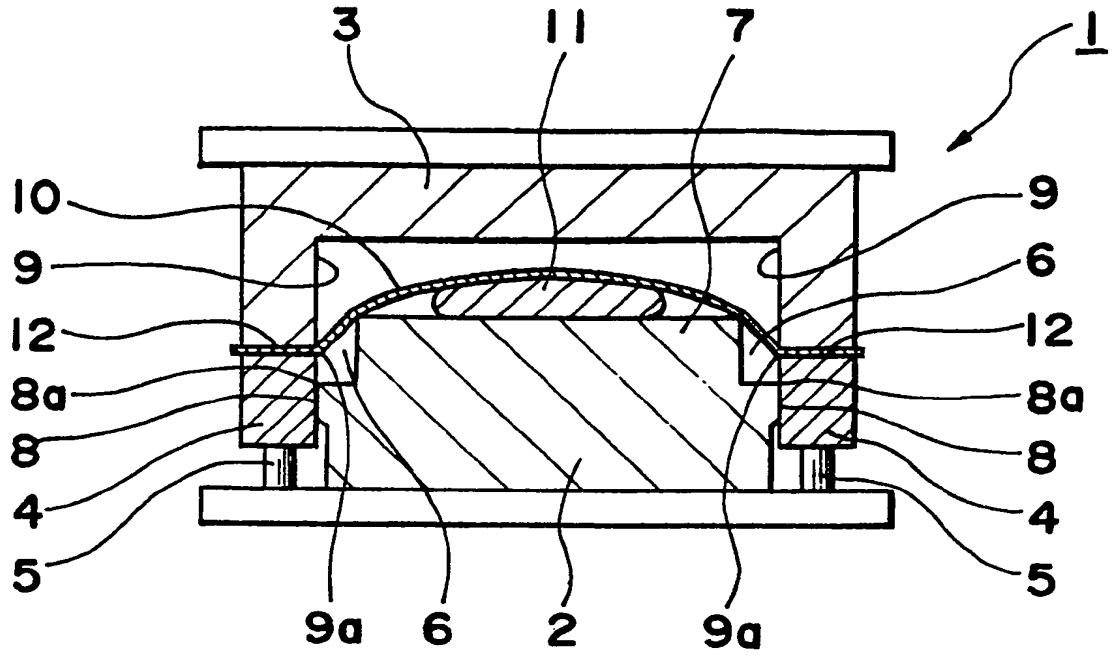

FIG. 4

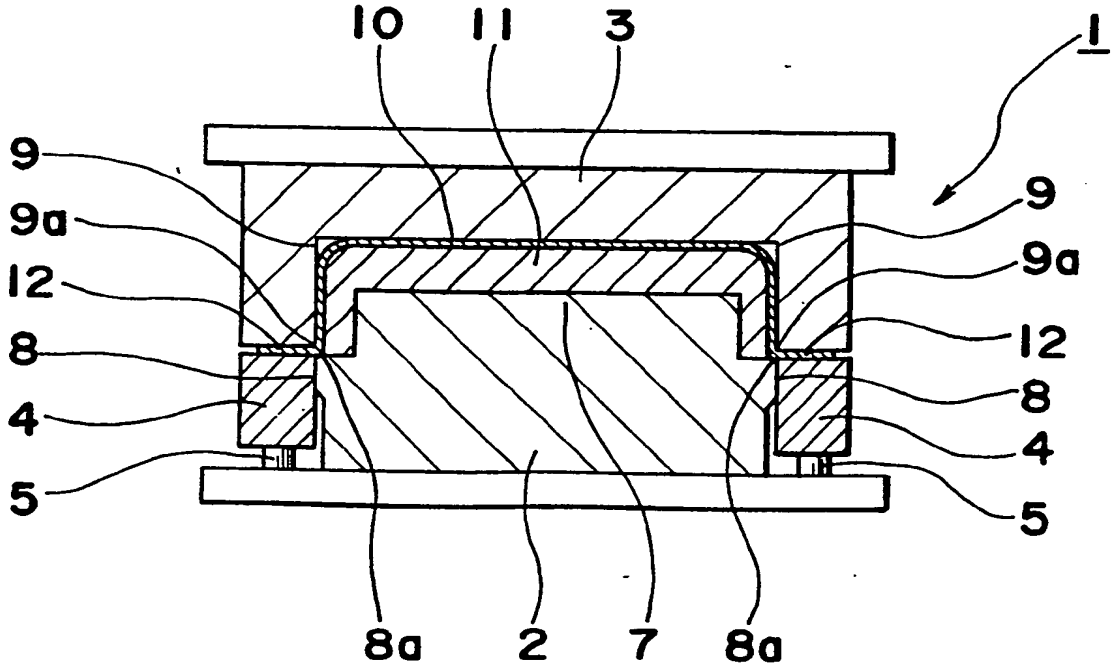

FIG. 5

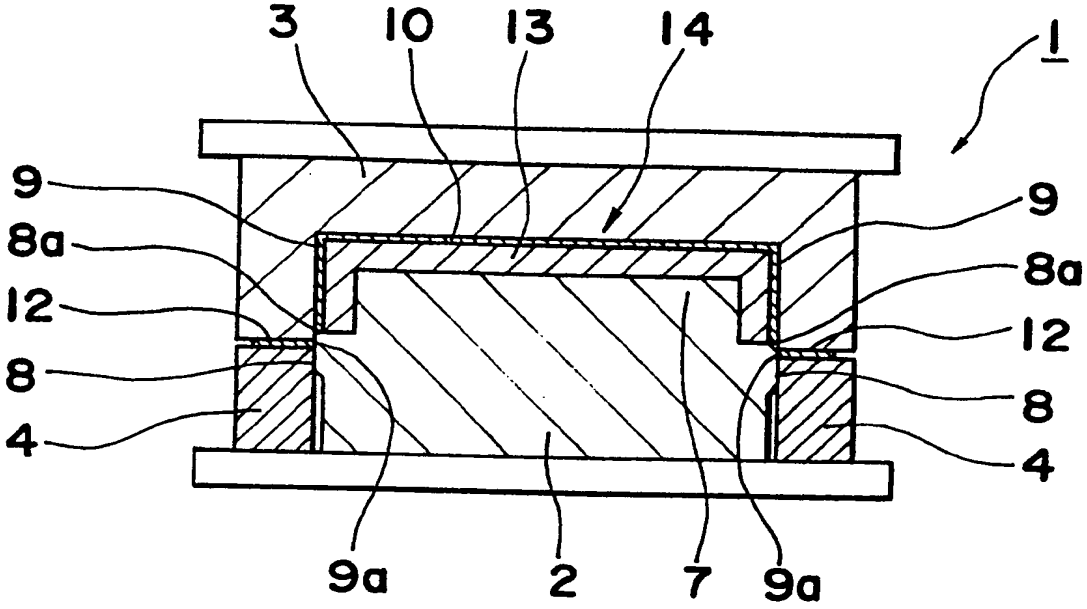

FIG. 6

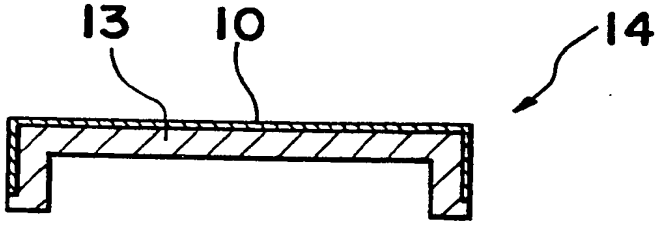

FIG. 7

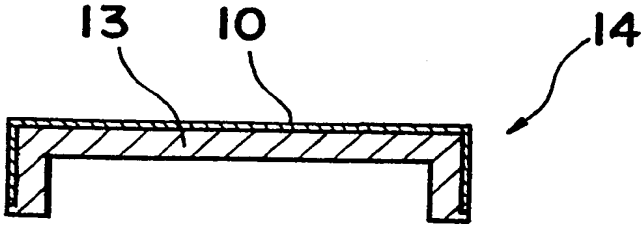

FIG. 8

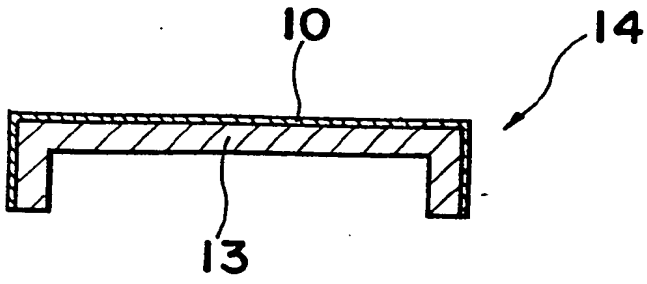

FIG. 9

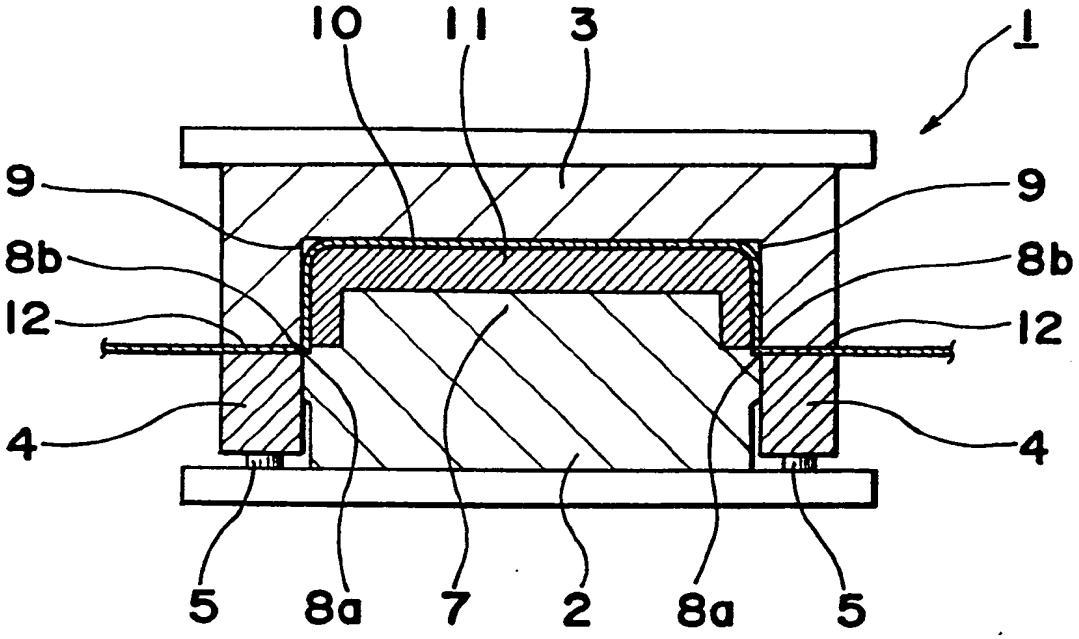

FIG. 10(a)

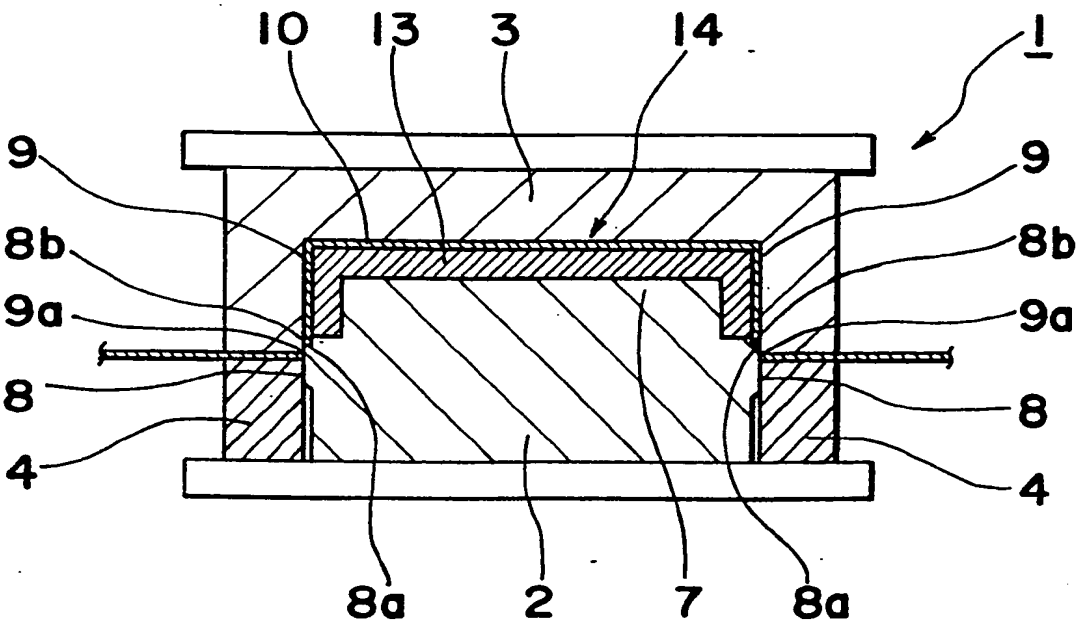

FIG. 10 (b)

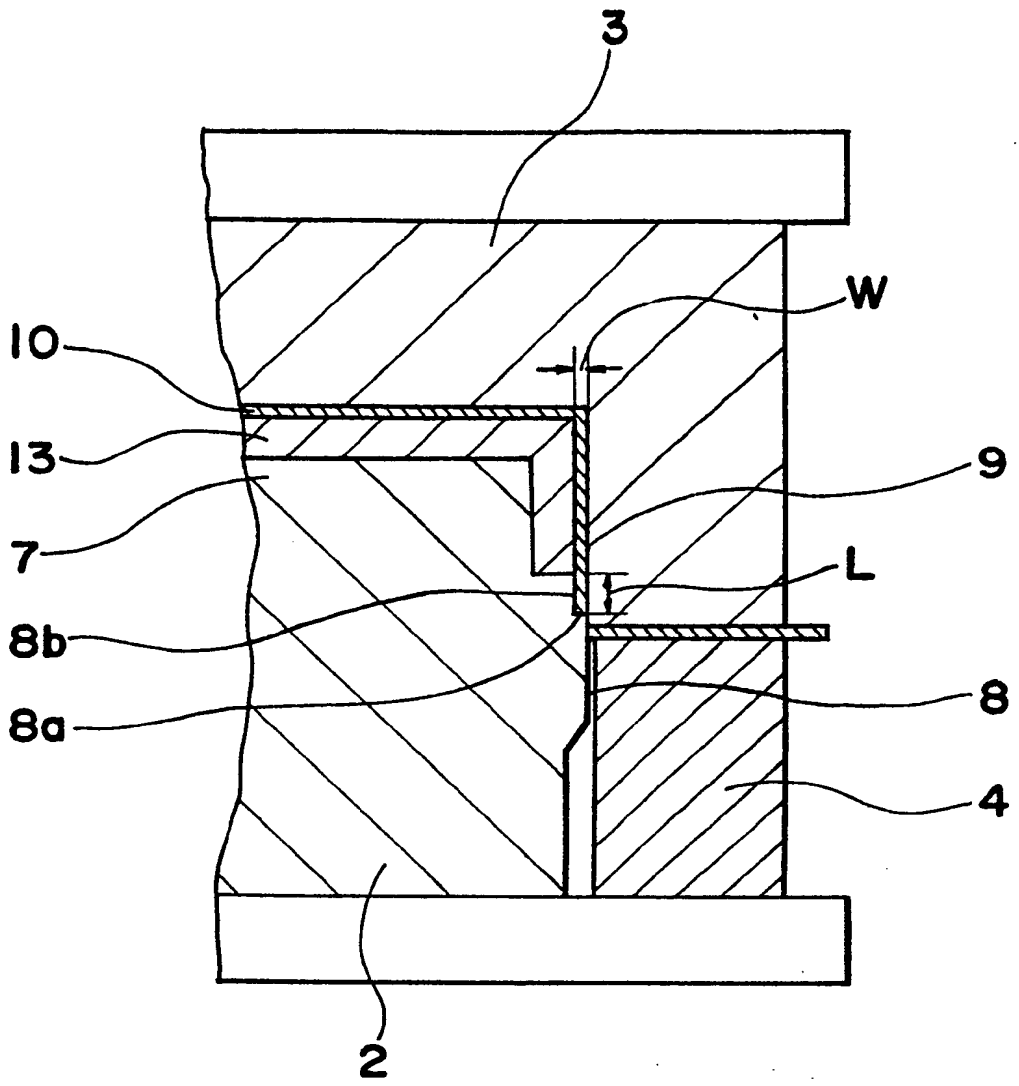

FIG. 11

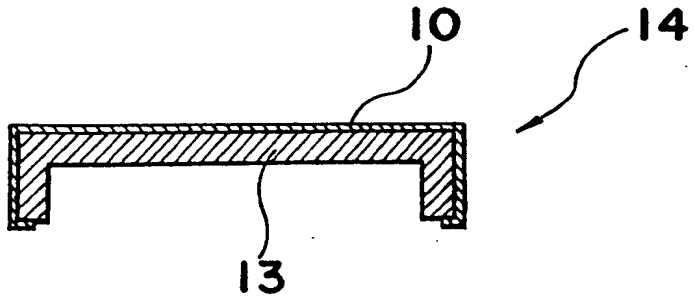

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FIG. 12

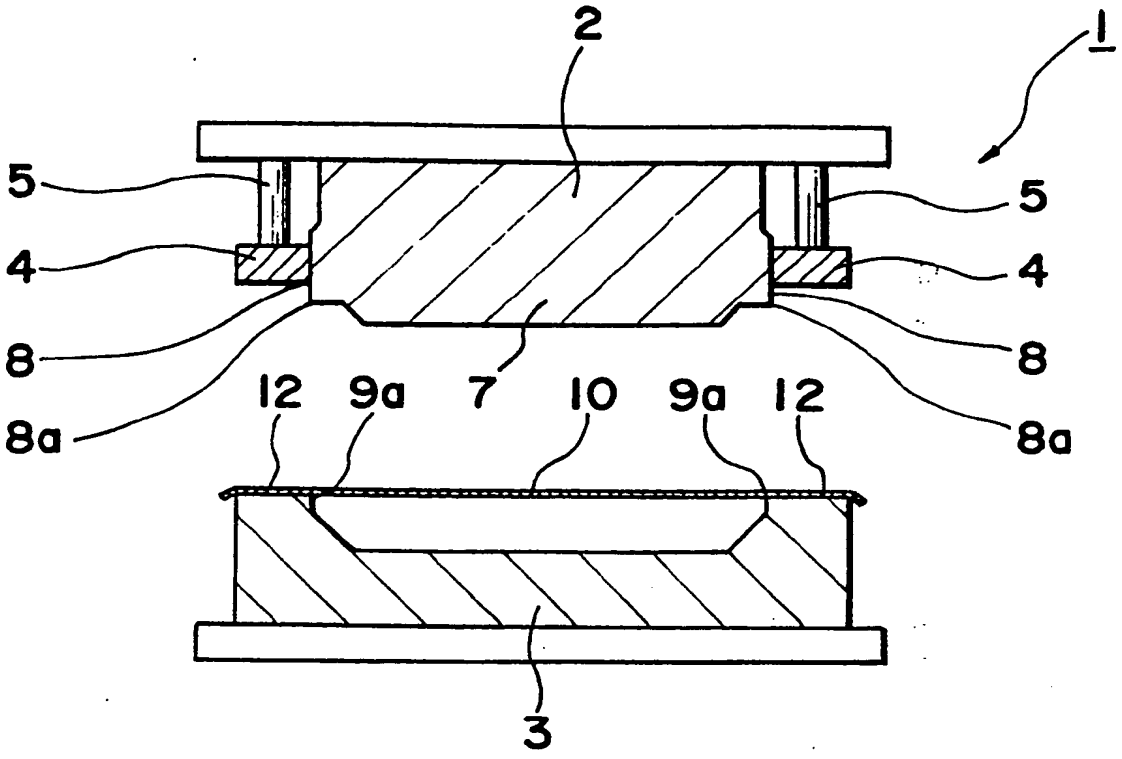

FIG. 13

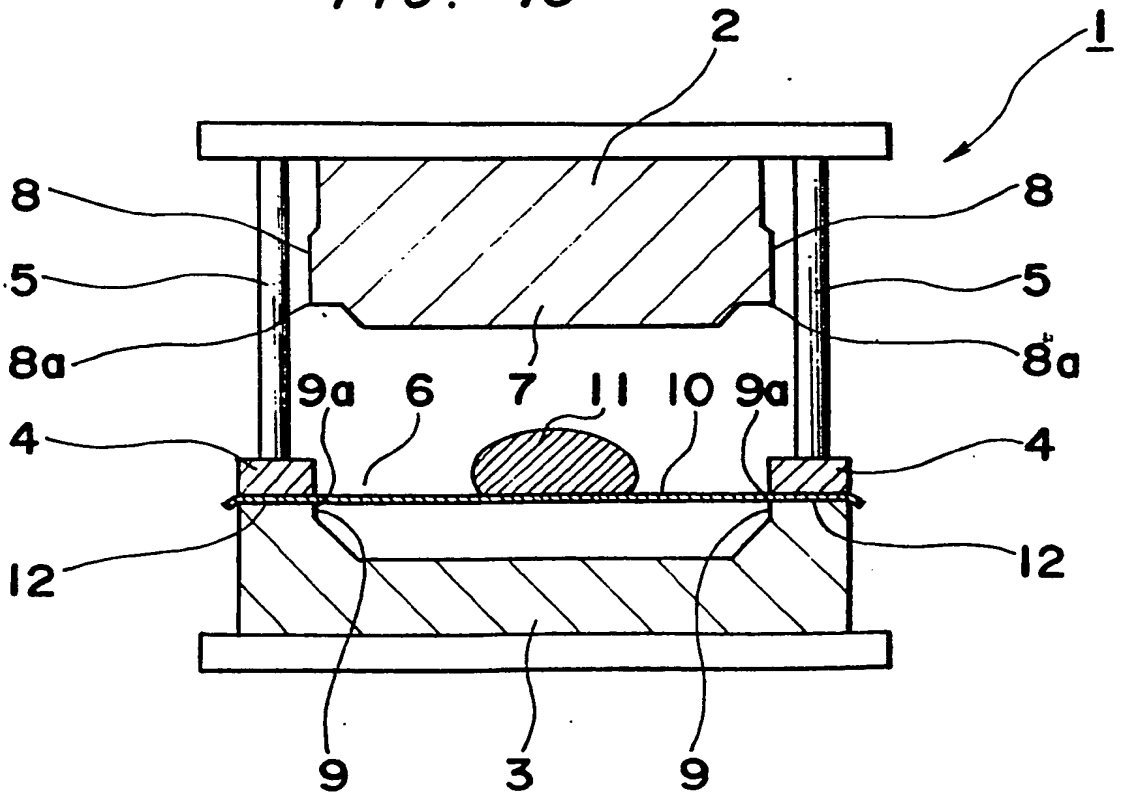

FIG. 14

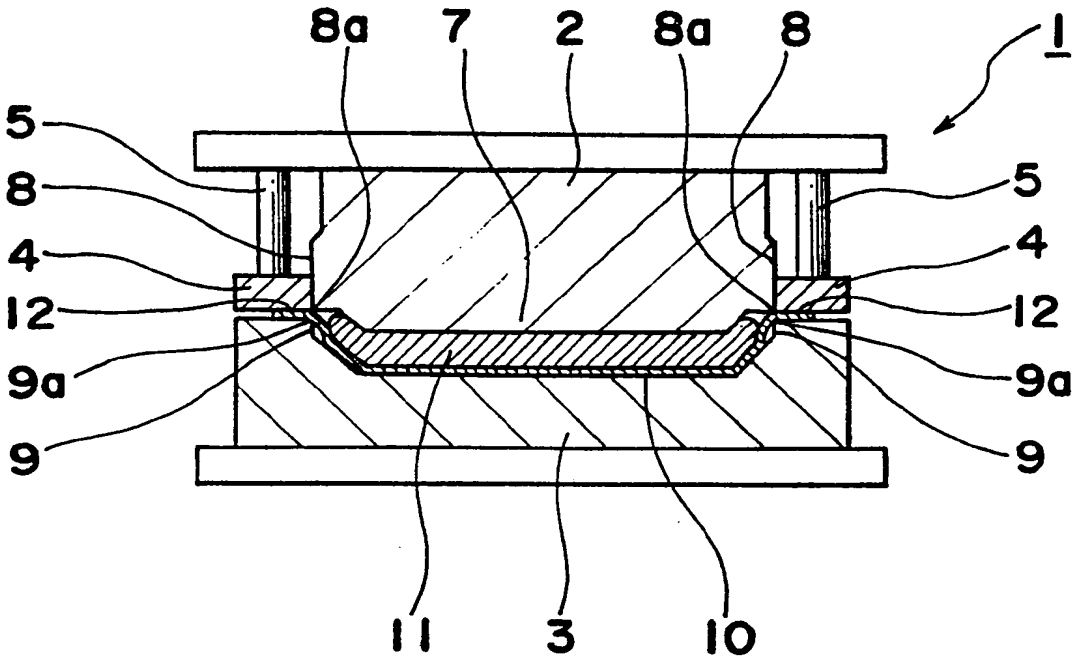

FIG. 15

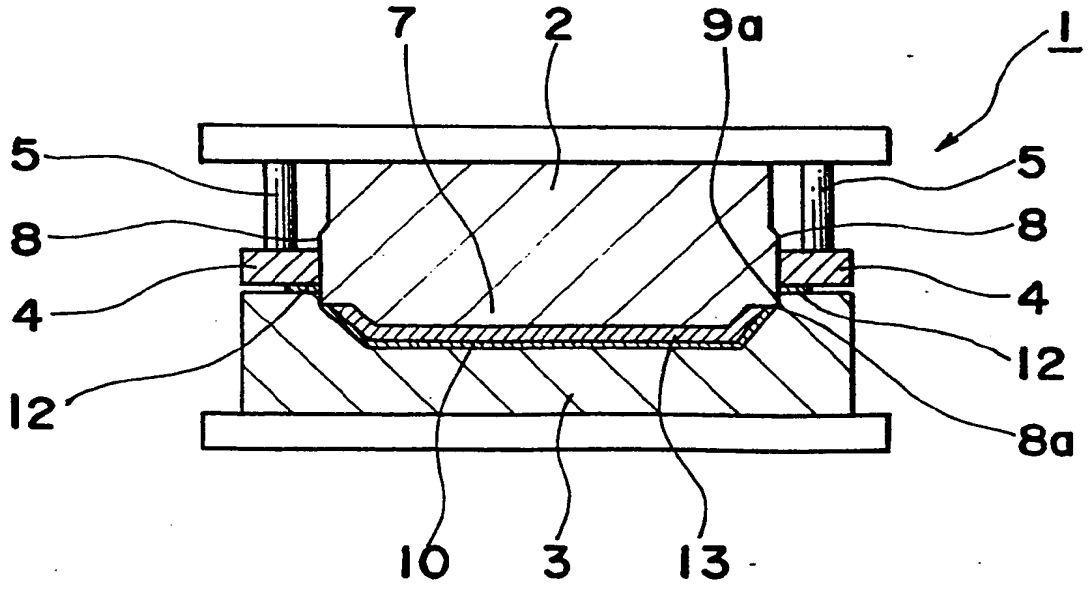

FIG. 16

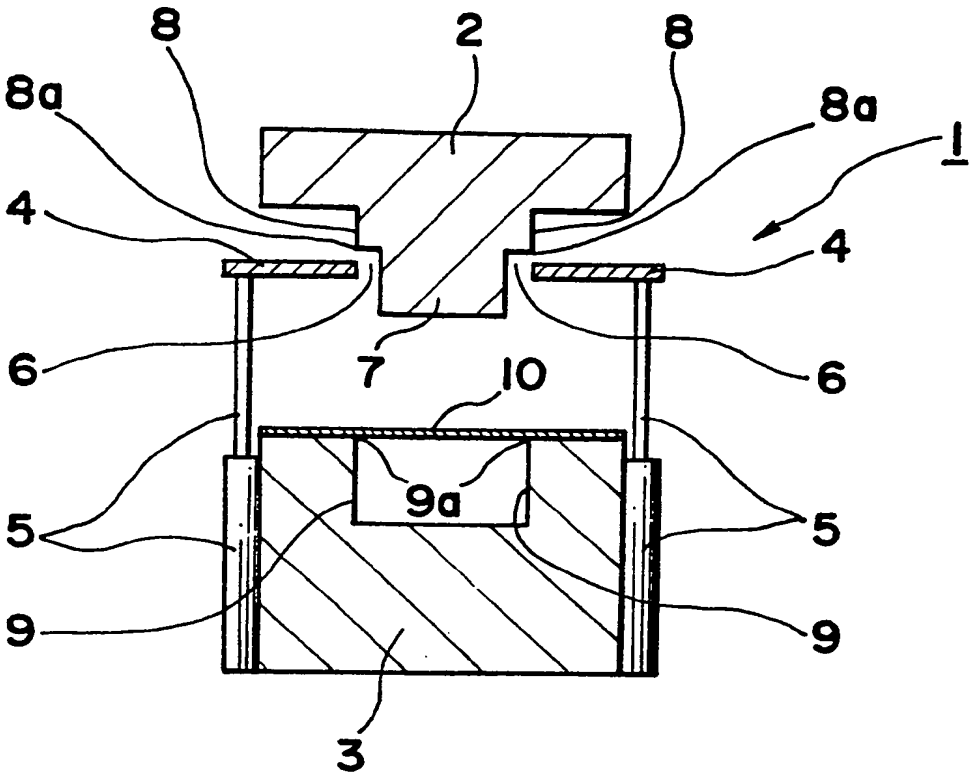

FIG. 17

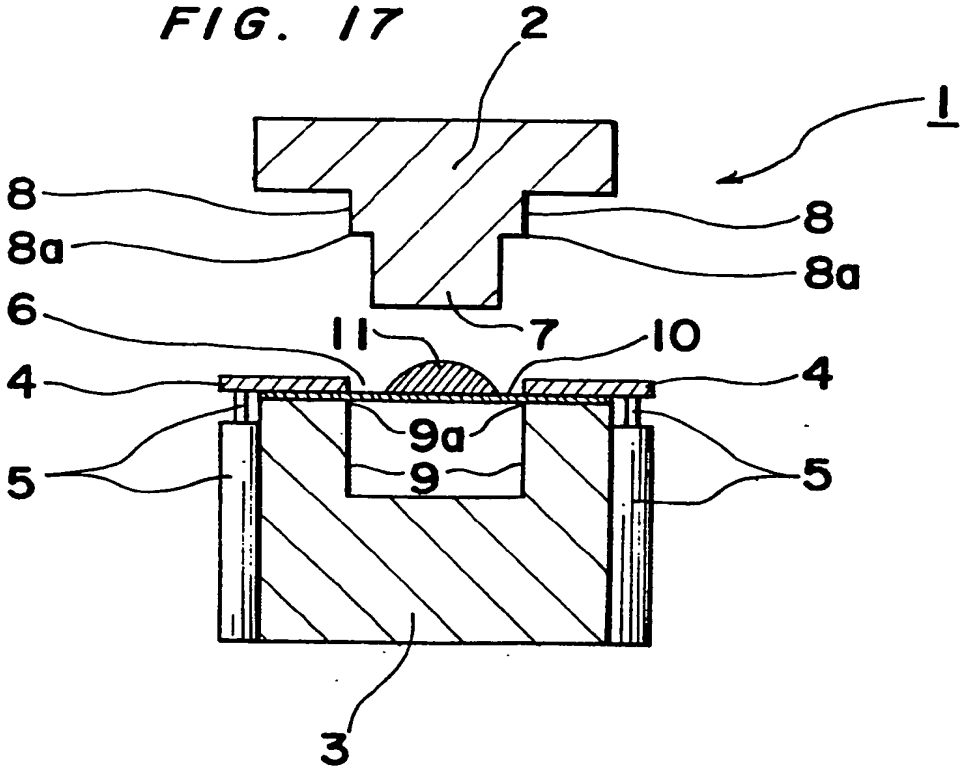

FIG. 18

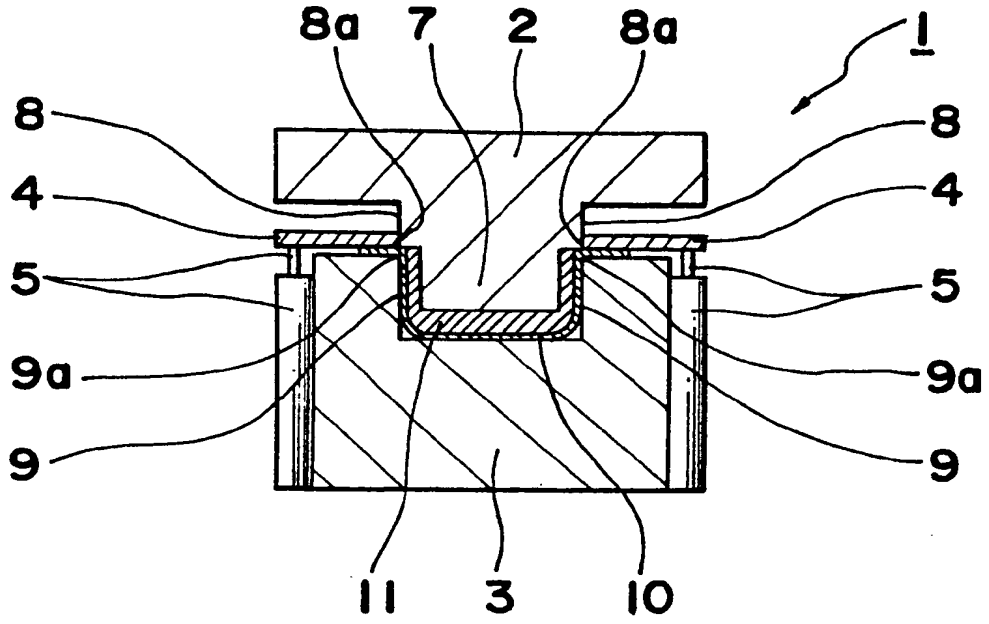

FIG. 19